REMARKS

The above amendments to the above-captioned application along with the following remarks are being submitted as a preliminary amendment to the Request for Continuing Examination filed June 21, 2005, and as a full and complete response to the Final Official Action dated March 21, 2005. In view of the above amendments and the following remarks, the Examiner is respectfully requested to give due reconsideration to this application, to indicate the allowability of the claims, and to pass this case to issue.

Status of the Claims

Claims 2-3, 5-6, 8-11, 13-14, 16-17 and 19-22 are under consideration in this application. Claims 2, 3, 5 and 6 are being amended, as set forth in the above marked-up presentation of the claim amendments, in order to more particularly define and distinctly claim applicants' invention. All the amendments to the claims are supported by the specification. Applicants hereby submit that no new matter is being introduced into the application through the submission of this supplemental response.

Formal Rejection

As best understood from the Office Action and Applicants' reading of the claims currently on file, claims 5 and 6 are rejected under 35 USC §112, second paragraph, as being indefinite. As set forth above, the claims are being amended to more particularly point out and distinctly claim the subject invention.

Prior Art Rejections

Claims 1, 4, 12, 15 and 18 were rejected under 35 U.S.C. §102(e) as being anticipated by U.S. Pat. App. Pub. No. 2003/0235717 of Veerdonk et al. (hereinafter "Veerdonk '717"), and claims 2-3, 5-11, 13-14, 16-17 and 19-20 were rejected under 35 U.S.C. § 102(e) or under §103(a) as being unpatentable over Veerdonk '717. These rejections have been carefully considered, but are most respectfully traversed.

The present invention as now recited in claim 2 is directed to a perpendicular magnetic recording medium including a substrate and a magnetic layer formed on the substrate, the magnetic layer comprising multilayer superlattice films of ferromagnetic metal layers which contain Co and paramagnetic metal layers which consist of Pd and/or Pt. The magnetic layer has a rate of decrease in coercivity defined by the multilayer superlattice films

of ferromagnetic metal layers being formed by sputtering deposition with a distance D_{TS} between the substrate and target areas of the multilayer superlattice films of ferromagnetic metal layers defined such that a product (P_O * D_{TS}) of a sputtering gas pressure P_O and the distance D_{TS} is at least 20 Pa*cm. The rate of decrease in coercivity of the magnetic layer, if exposed to extreme temperature change, is less than 0.15 when the rate is evaluated by a formula: [H_c at 25 degrees Celsius – H_c at 70 degrees Celsius]/H_c at 25 degrees Celsius, where H_c is the coercivity of the magnetic layer.

As set forth in claim 3, the present invention is directed to a perpendicular magnetic recording medium including a substrate and a magnetic layer formed on the substrate, the magnetic layer comprising multilayer superlattice films of ferromagnetic metal layers which contain Co and paramagnetic metal layers which consist of Pd and/or Pt, the magnetic layer having a rate of decrease in coercivity defined by the multilayer superlattice films of ferromagnetic metal layers being formed by sputtering deposition with a distance D_{TS} between the substrate and target areas of the multilayer superlattice films of ferromagnetic metal layers defined such that a product (P_O * D_{TS}) of a sputtering gas pressure P_O and the distance D_{TS} is at least 20 Pa*cm. When a magnetic torque loop of the perpendicular magnetic recording medium is measured with a torque magnetometer, the polarity of a value of loop components with translational symmetry of 90 degrees is opposite to the polarity of a value of loop components with translational symmetry of 180 degrees.

As discussed in the previous response, in the prior art, the magnetic moment in noble metal atoms is unstable, while according to the present invention, the magnetic moment in noble metal atoms into the multilayer superlattice films of ferromagnetic metal layers is stable, due to the unique sputtering requirement of (P_O * D_{TS}) $\geq$ 20 Pa*cm.

Applicants will point out that, when the magnetic layer is formed with multilayer superlattice films of ferromagnetic metal layers which contain Co and paramagnetic metal layers which consist of Pd and/or Pt, the magnetic layer having a rate of decrease in coercivity defined by the multilayer superlattice films of ferromagnetic metal layers being formed by sputtering deposition with a distance D_{TS} between the substrate and target areas of the multilayer superlattice films of ferromagnetic metal layers defined such that a product (P_O * D_{TS}) of a sputtering gas pressure P_O and the distance D_{TS} is at least 20 Pa*cm, sputter particles jetted from the targets collide with the gas repeatedly in the chamber eventually settle on the substrate surface such that their kinetic energy is less. The magnetic moment induced in noble metal atoms in the superlattice so-formed is stable even if being positioned

away from the interface between the ferromagnetic metal layer and the noble metal layer, since the noble metal atoms are exactly arranged in an intended crystalline structure (p. 18, line 27 to p 19, line 5).

Applicants respectfully contend that Veerdonk '717 fails to teach or suggest the magnetic layer comprising multilayer superlattice films of ferromagnetic metal layers which contain Co and paramagnetic metal layers which consist of Pd and/or Pt, the magnetic layer having a rate of decrease in coercivity defined by the multilayer superlattice films of ferromagnetic metal layers being formed by sputtering deposition with a distance D_{TS} between the substrate and target areas of the multilayer superlattice films of ferromagnetic metal layers defined such that a product (P_O * D_{TS}) of a sputtering gas pressure P_O and the distance D_{TS} is at least 20 Pa*cm, so as to provide (1) the rate of decrease in coercivity of the multiplayer superlattice films of ferromagnetic metal layers is less than 0.15 (claim 2); and (2) when a magnetic torque loop of the perpendicular magnetic recording medium is measured with a torque magnetometer, the polarity of a value of loop components with translational symmetry of 90 degrees is opposite to the polarity of a value of loop components with translational symmetry of 180 degrees as the invention (claim 3).

Rather, Veerdonk '717 merely discloses in its paragraph [0020] that the "composite layer 22 has a thickness T_m typically of from about 0.2 to about 0.8 nm, for example, from about 0.3 to about 0.5 nm. As shown most clearly in FIG. 1, each nonmagnetic spacer layer 24 has a thickness T_n typically of from about 0.6 to about 3 nm, for example, from about 0.8 to about 1.5 nm. The thickness of each composite layer T_m may be the same throughout the multilayer structure 20, and the thickness of each nonmagnetic spacer layer T_n may be the same throughout the multilayer structure 20. Alternatively, the thicknesses T_m of the composite layers 22 may vary, and the thicknesses T_n of the nonmagnetic spacer layers 24 may vary, throughout the multilayer structure 20."

Further, Veerdonk '717 disclose in paragraph [0026] that "[a]fter the multilayers have been deposited, the multilayer structure may optionally be annealed. Typical annealing operations may be carried out at temperatures of from about 150 to about 350 degrees C or higher, for times of from about 1 minute to about 2 hours, depending on the type of material."

The formation of the multilayers and the resulting multilayer structure of Veerdonk '717 do not in any way take into consideration the formation of any structure even remotely similar to that of the present invention. First, not only does Veerdonk '717 fall short of providing any disclosure to guide the thicknesses of the layers of the multilayer structure in a

manner so as to create a relationship similar to the sputtering gas pressure P_O and the distance D_{TS} of the present invention, this reference goes further to disclosing the use of annealing the multilayers which forecloses the possibility of such a relationship as the annealing would change the final thicknesses of all the layers. In essence, Applicants will contend that Veerdonk '717 is incapable of achieving a structure similar to that of the present invention as claimed.

As such, the present invention as now claimed in independent claims 2-3 is distinguishable and thereby allowable over the rejections raised in the Office Action. The withdrawal of the outstanding prior art rejections is in order, and is respectfully solicited.

Conclusion

In view of all the above, clear and distinct differences as discussed exist between the present invention as now claimed and the prior art reference upon which the rejections in the Office Action rely, Applicant respectfully contends that the prior art references cannot anticipate the present invention or render the present invention obvious. Rather, the present invention as a whole is distinguishable, and thereby allowable over the prior art.

Favorable reconsideration of this application is respectfully solicited. Should there be any outstanding issues requiring discussion that would further the prosecution and allowance of the above-captioned application, the Examiner is invited to contact the Applicants' undersigned representative at the address and phone number indicated below.

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